THE FREEZING PROCESS IN SEA WATER AROUND EAST ONGUL ISLAND, ANTARCTICA IN 1980 (EXTENDED ABSTRACT)

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On March 17–18, 1980 a heavy blizzard hit Syowa Station (69°00′S, 39°35′E) on East Ongul Island and the multi-year ice around the island was broken and drifted away. The sea ice around the island had never disappeared since the

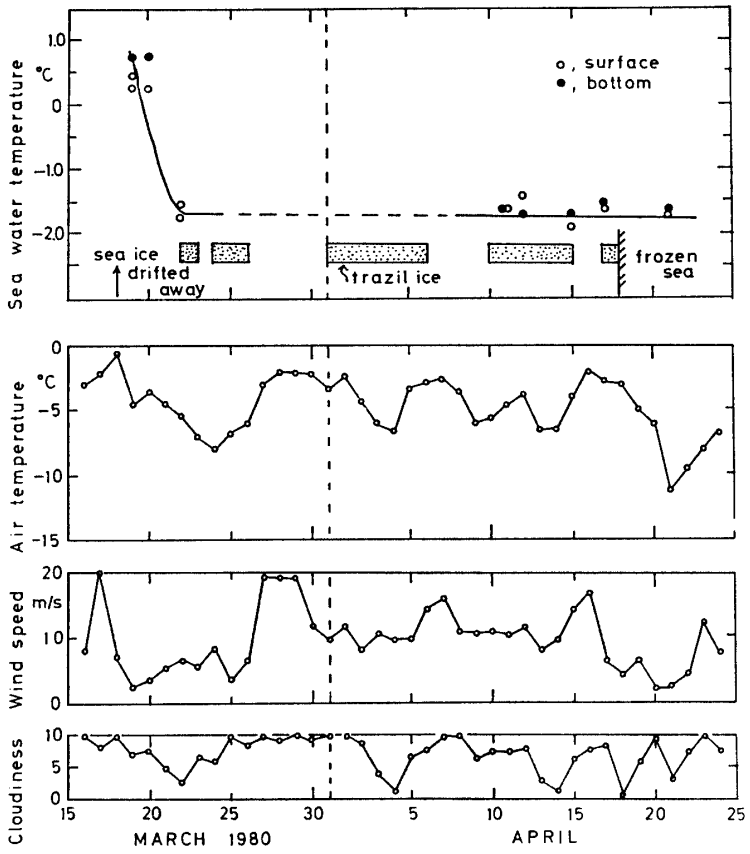

Fig. 1. Illustrated summary of frazil ice formation together with meteorological elements in 1980 at Syowa Station.

establishment of Syowa Station in 1957. Up to the present, studies on the growth of winter ice with thicknesses of 50 cm to 100 cm have been carried out (KUSUNOKI *et al.*, 1970; NARUSE *et al.*, 1971; WAKATSUCHI, 1977, 1982). Observations on the freezing processes were started on March 19 in Nisino-ura Cove of East Ongul Island. Frazil ice (or anchor ice) frequently formed under cold and windy conditions, and its formation also occurred onto a fish-collecting net. The assemblage of frazil ice formed grease ice and floated to the water surface, which exhibited a mirror-like surface because the grease ice absorbed wave action. It was also observed that the grease ice formed in long rows parallel to the wind direction. A similar phenomenon on grease ice rows was reported by MARTIN and KAUFFMAN (1981) who explained the grease ice rows due to the Langmuir circulation.

Figure 1 shows the occurrence of frazil ice and the formation of sea ice together with the data of sea water temperature, air temperature, wind speed and cloudiness. The present observation indicated that the formation of frazil ice appears to be closely related to the cooling of sea water. The cooling of the sea water normally takes place by long-wave radiation, evaporation, heat conduction at or near the sea surface, and advection of cold water. Cooling at the surface induces thermo-haline convection which is enhanced by the freezing at the surface and mechanical mixing of ice and sea water by strong winds at or near the sea surface (*e.g.* FOLDVIK and KVINGE, 1977). When the sea ice drifted on March 19, the surface water temperature was $+0.5°C$. The first appearance of ice crystals and ice platelets was observed on March 22, when the water temperature was $-1.7°C$ which was near the freezing point. Finally, the sea around the island froze in April and the thickness of sea ice continuously increased until October.

A full paper will be contributed to Seppyo, the Journal of the Japanese Society of Snow and Ice.

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